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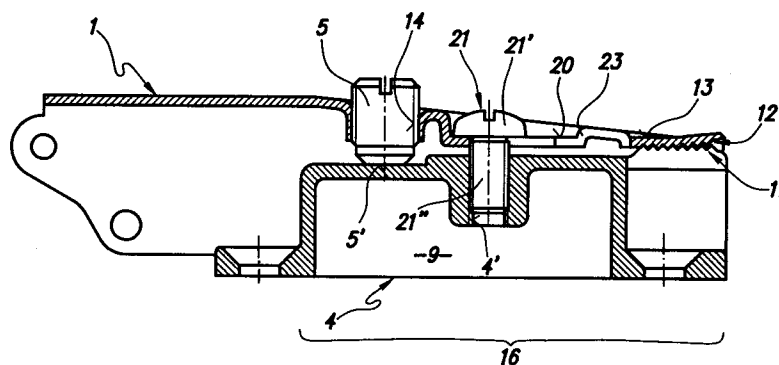
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W-8000 München 90(DE)(54) **Furniture hinge.**

(57) The invention belongs to the area of fittings for furniture, and relates to a dismountable and adjustable hinge for the incorporation into units of furniture.

The hinge comprises a hinge arm (1) tightened to a base plate (4) by means of a fastening screw (21), whose screwhead (21') cooperates with a longitudinal slot (19) formed in a depression (20) of the hinge arm (1), in which depression (20) there is opposite to a circular widening (19') serving as a termination of the longitudinal slot (19), foreseen an upright border (23) for the limitation of the longitudinal shifting of the hinge arm (1). Into a female thread (14) of the hinge arm (1) an adjusting threaded bolt

(5) is screwed for adjusting the inclination of the hinge arm (1) with respect to the base plate (4), by its bottom surface (5') said adjusting threaded bolt (5) resting on a high-level step (16) of the base plate (4). In order to ensure stable and safe cooperation of the base plate (4) and the hinge arm (1) at whatever inclination, there is on the free end part of the hinge arm (1) foreseen an arcuated depression (13), below which are foreseen downwardly oriented transversal ribs (12), which continuously mate ribs (11) provided on the upper surfaces of sidewalls (9) of the base plate (4).

*Fig.1***EP 0 496 042 A1**

The present invention relates to a hinge for the incorporation into units of furniture, whereby at assembling or disassembling, respectively, said units of furniture, the hinge enables both quick assembling and disassembling as well as respective adjustment of the relative positions of components of these units, providing thereby stable and safe holding thereof in the assembly.

The object of the invention belongs to the field of construction engineering, particularly to fittings for hinging door leaves, window wings, and the like, in furniture industry.

According to the *Int. Cl.* (4th edition) the invention can be classified into Classes E 05 D 7/04 and E 05 D 7/12.

Several solutions of hinges of this type are known in prior art, the hinges essentially consisting of a hinge arm, which is by means of toggle joints swingably attached thereto connected to a dowel cup of the hinge, the latter being inserted into an appropriate blind hole provided, e.g., in the door leaf of the furniture unit, where the dowel cup is fastened by appropriate screws. On the other side the hinge arm is by means of a screw dismountably bound to a base plate, against which it is adjusted by means of a threaded bolt, the base plate in turn being fastened to, e.g., a side panel of the furniture unit.

A known solution of an adjusting hinge arm is shown in the German patent specification DE 34 44 994 A1. The solution provides a hinge arm tightened by a tightening screw to a base plate, said tightening screw arranged in a longitudinal slot of the hinge arm, having a standard buttonhead, beneath which there is positioned a washer as an additional element made of an elastic and/or plastic material. Besides, in the direction towards the end of the hinge arm, foreseen to receive the toggle joints, there is provided an adjusting threaded bolt screwed in a female thread located in the upper part of the hinge arm. By its even bottom surface this adjusting threaded bolt rests on a flat surface part of the base plate. At the opposite end section of the hinge arm the latter provides a vertically bent section of constituent sheet metal, which is also supported by a flat surface part of the base plate.

There are obvious disadvantages of the above solution of the adjusting hinge arm, which result from the circumstance that at the hinge arm, at adjusting the position, inclined with respect to the base plate, the contact area between the flat part of the base plate and the supporting surface of the abovementioned vertical section of the hinge arm is limited to a biting edge only, which does not provide a stable and safe assembly of the hinge arm and, more precisely, under these circumstances the hinge arm and, thereby, e.g., a leaf of a wing of

a furniture unit bound hereto are not prevented from undesirable shifting thereof in longitudinal direction. Also, at such an inclination of the hinge arm the adjusting threaded bolt rests only by a little part of its even bottom surface on the flat surface section of the base plate, which at exertion of greater forces at opening and closing, e.g., the door of a unit of furniture, leads to deformations of the respective surface on the supporting place. Occurrences of this type can lead to loosening and disassembling of the connection of the hinge arm and of the base plate of the hinge, accompanied with all undesirable consequences, such as unhinging of the door leaf of furniture unit.

Another known solution of a hinge arm and a base plate is shown in German patent specification DE 32 45 227 A1. At this solution the hinge arm is connected to the base plate by a countersunk screw, this screw being arranged in a respectively formed longitudinal slot of the hinge arm. An adjusting threaded bolt arranged at a distance thereof is screwed in a female thread foreseen in the upper section of the hinge arm. This adjusting threaded bolt, in turn, by its chamfered bottom surface rests on a slanting, ramp-like portion of the base plate. Besides, this hinge arm by its sidewalls, which by being bent downwards in transversal section form a \cap , rests on bottom surfaces of respective grooves foreseen in the base plate.

The drawbacks of also this solution become apparent at an inclined position of the hinge arm with respect to the base plate at adjusting the position of the hinge and thereby, e.g., a door leaf of a furniture unit. In this position the tightening screw merely rests by a little part of its countersunk screw on shoulder sections, which limit the longitudinal slot, without creating a tightening force sufficient to achieve stable and safe interconnection of the hinge arm and the base plate. Such a force cannot even be created in the position analyzed by straight edges of vertical sidewalls of the hinge arm, which also rest by little parts of their lengths in the respective grooves of the base plate only. The slanting portion of the base plate which supports the bottom surface of the adjusting threaded bolt can, in fact, create such a force, but only under the condition that one intends to shift the hinge arm in the direction towards said increasing slanting portion. When the hinge arm is shifted in the opposite direction which, e.g., occurs by pressing the leaf of a door onto the box body of a furniture unit, there can appear undesirable loosening and disassembling of this interconnection accompanied with all undesirable consequences, such as e.g. unhinging of the door leaf.

On the basis of statement given above, the technical problem solved by the object of the present invention is how to realize a constructional

solution of a furniture hinge, particularly a hinge arm and a base plate, whereby at assembling and disassembling the units of furniture the hinge arm and the base plate enabled quick, easy, and exact assembling and disassembling, having in mind the condition that even in cases of extreme deflections of the hinge arm both in the direction to the unit of furniture and in the direction from same, as well as in the direction to a side panel thereof and in the direction from same, fastening of the hinge arm onto the base plate was realized rigidly and safely without risk for the hinge arm to unlock from the assembly.

In accordance with the above definition of the technical problem the aim of the invention is realized in novel manner in that in the hinge arm which in transversal section has the shape of a \cap , at its rear end section an arcuated depression is foreseen, below which there are arranged transversal ribs. In each position of the hinge arm at adjusting thereof both as to orientation as well as to height, these ribs continuously cooperate with respective transversal ribs provided on sidewalls of the rear end section of the base plate. Thus, stable and safe interconnection of the hinge arm and the base plate of the hinge, accompanied with respective components of the furniture unit is attained, which is a first fundamental feature of the object of the invention.

In addition to the arcuated depression there is at a distance both from the free end of the hinge arm and from the arcuated depression, on the upper side of the hinge arm foreseen a second depression, the two depressions being aligned. In the second depression there is foreseen a longitudinal slot terminated by a circular widening for passing the standard-shape screwhead of a fastening screw, which is by its threaded shaft screwed into a respective taphole of the base plate. Said second depression terminates opposite to said circular widening by a border which, in fact, serves as a lateral abutment for the screwhead of the fastening screw. Said abutment prevents the hinge from disassembling when the fastening screw loosens, which is a further feature of the object of the invention.

Next to the fastening screw there is in the upper section of the hinge arm foreseen a female thread, into which is screwed an adjusting threaded bolt, whose bottom surface rests upon a flat upper surface section of the base plate of the hinge. In its longitudinal sectional elevation said base plate provides a high-level step which in transversal section in combination with two sidewalls forms a box section of the base plate.

In said step the abovementioned taphole for the fastening screw is arranged in coincidence with the longitudinal slot of the hinge arm, the end part

of said high-level step, particularly the related to sidewalls, being provided with transversal ribs for, as said, mating the ribs foreseen below the arcuated depression of the hinge arm, arranged at the free end of the latter. Moreover, in said end part of the high-level step of the base plate, between said ribbed sidewalls, there is foreseen an idle space, which can serve for the incorporation of additional constructional elements, e.g. for providing a fastening bearing of the hinge.

The furniture hinge according to the present invention will be shown and described in more detail by means of an embodiment, without limiting the invention thereby to the scope of embodiment of the hinge shown in the attached drawings, wherein show:

Fig. 1 a longitudinal sectional elevation of a hinge arm and a base plate in fundamental position for adjusting the hinge, and

Fig. 2 a top view of the assembly of Fig. 1.

The furniture hinge according to the invention, shown in Figs. 1 and 2, comprises a hinge arm 1 which is by means of toggle joints (not shown) swingably bound to a dowel cup of the hinge, incorporated into, e.g., a leaf of a door of a unit of furniture (not shown).

The base plate 4 of the hinge, which is, e.g., fastened on a side panel of a unit of furniture (not shown in the drawing) is dismountably and adjustably interconnected with the hinge arm 1 by means of a fastening screw 21. In transversal section, the hinge arm 1 as such is according to Figs. 1 and 2 bent to form the shape of a \cap , at its free end part the hinge arm 1 providing an arcuated depression 13, below which there are foreseen transversal ribs 12 for the cooperation with respective ribs 11 arranged on the upper surfaces of end parts of sidewalls 9, forming a high-level step 16 of the base plate 4 of the hinge. Along the hinge arm 1 there is above the high-level step 16 of the base plate 4 foreseen a longitudinal slot 19, which is arranged in a second depression 20, aligned with the abovementioned first depression 13. Said longitudinal slot 19 terminates by a circular widening 19' for passing the screwhead 21' of the fastening screw 21 which, in turn, by its threaded shaft 21" passes the longitudinal slot 19, at adjusting the hinge thus making possible longitudinal guiding and shifting of the hinge arm 1 along the base plate 4 of the hinge. Opposite to the circular widening 19' the depression 20 is limited by a border 23 for abutting on the screwhead 21' of the fastening screw 21, when the hinge arm 1 is in the longitudinal direction shifted to the end position. Thereby, the hinge arm 1 is prevented from disconnecting in the assembly.

Further along the hinge arm 1, which in trans-

versal section provides the form of a \cap , there is foreseen a female thread 14, into which an adjusting threaded bolt 5 is screwed, which provides a threadless, cylindrical end part. On the last-mentioned end part said adjusting threaded bolt 5 provides a bottom resting surface 5', which can be flat, hemispherical or the like, by means of which the adjusting threaded bolt 5 rests on a flat surface section of the high-level step 16 of the base plate 4. In the area of its free end, according to Fig. 1 the hinge arm 1 provides two openings in each sidewall 9 for the insertion of respective axles for the suspension of toggle joints, which will not be explained in more detail due to the circumstance that they do not represent the substance of the invention.

As evident, in the longitudinal sectional elevation of the base plate 4, the high-level step 16 in transversal section together with the two sidewalls 9 forms a box section of the base plate 4. In the high-level step 16 there is in coincidence with the longitudinal slot 19 of the hinge arm 1 foreseen a taphole 4' for screwing-in the threaded shaft 21" of the fastening screw 21, which by its screwhead 21' presses from above the shoulders of the longitudinal slot 19 arranged in the second depression 20 of the hinge arm 1, holding the latter in assembled state with the base plate 4 of the hinge. At one end the base plate 4 terminates by sidewalls 9, between which an idle space is left, limited at the bottom by a flattened bottom part, which is similar to the one provided at the other end of the base plate 4, and provided with a recess for a countersunk screwhead of a fastening screw for fastening the base plate 4, e.g., on a side panel of a unit of furniture. On the upper surfaces of said sidewalls 9, these surfaces straight, transversal ribs 11 are arranged for the cooperation with the respective ribs 12 provided below the arcuated depression 13 of the hinge arm 1.

The furniture hinge according to the invention is used in that the hinge arm 1 prefastened, e.g., on a leaf of a door of a unit of furniture, is positioned to attain the coaxiality of the circular widening 19' of the longitudinal slot 19, and the screwhead 21' of the fastening screw 21, which is partially pre-screwed on its place in the base plate 4. After the screwhead 21' passes the circular widening 19', the hinge arm 1 together with the component of the furniture unit fastened hereto is shifted in the direction A of Fig. 2. Thereby, the threaded shaft 21" of the fastening screw 21 enters the longitudinal slot 19, the screwhead 21' of the fastening screw 21 entering the second depression 20 of the hinge arm 1. By tightening the fastening screw 21, the prescrewed adjusting threaded bolt 5 by its bottom surface 5' rests onto the upper front part of the high-level step 16 of the base plate 4,

whereas the ribs 12 arranged below the arcuated depression 13 mate the ribs 11 of the base plate 4 of the hinge. Thus, the hinge arm 1 becomes a beam supported by two supports, on the one hand supported by the adjusting threaded bolt 5 and on the other hand supported by mated ribs 11 and 12.

The height of the hinge, i.e. the extent of the gap between the leaf of the door and the box body of the unit of furniture, is adjusted by screwing-in or unscrewing the adjusting threaded bolt 5. By said adjusting threaded bolt 5, which by its bottom surface 5' rests on the upper surface of the high-level step 16 of the base plate 4, the latter thus supporting the former, the hinge arm 1 is respectively raised or lowered into the position necessary. Hereby, the ribs 12 belonging to the arcuated depression 13 of the hinge arm 1 under mating conditions roll over the ribs 11 of the base plate 4 similarly to rolling a sprocket along a rack, thereby supporting said raising or lowering motion of the hinge arm 1.

In view of the above essential feature of the object of the invention there is continuously preserved a satisfactory stable connection between the hinge arm 1 carrying, e.g., a leaf of a door of a unit of furniture, and the stationary base plate 4 fastened to, e.g., a side panel of the box body of furniture.

In the course of the exploitation, particularly when opening a leaf of a door by using a force greater than foreseen, the tightening state of the fastening screw 21 and the base plate 4 can really weaken. In order to evade the danger that under said extreme circumstances the hinge arm 1 was separated from the base plate 4 of the hinge, there is in the depression 20 opposite to the circular widening 19' of the longitudinal slot 19 foreseen an upright semicircular border 23, whereon in this case abuts the side surface of the screwhead 21' of the fastening screw 21, preventing thereby further longitudinal shifting of the hinge arm 1 and, thus, disassembling.

According to one of the embodiments of the invention, for which protection is claimed, the hinge arm 1 is manufactured of a steel sheet of 1.0 mm thickness by punching, bending and stamping, providing a basis width of 15.0 mm. After the operations of treating were finished, the hinge arm 1 provides a transversal section in form of a \cap having recesses shown in Fig. 1 as well as impressed ribs 12. After machining the M7-thread in the respective recess (female thread 14) for the M7-adjusting threaded bolt 5, there follows final treatment of the hinge arm 1, comprising removal of sharp edges and smoothing the mantle surface.

In this embodiment the base plate 4 of the hinge is made by die-casting process of a copper-zinc-nickel alloy by means of an appropriate tool.

By this manufacturing approach all recesses shown in Figs. 1 and 2, as well as ribs 11 are made. After taking the product, i.e. the base plate 4, from the die, it is subjected to surface treatment, e.g., in a drum, to remove sharp edges and to smooth the mantle surface, whereafter the M7-thread is machined in the bore, the taphole 4'.

The adjusting threaded bolt 5 and the fastening screw 21 are machined by cutting technics, e.g. by means of turning lathe automatons, of a steel alloy, and are also surface treated.

The assembly of the hinge is completed after the hinge arm 1 has under the interposition of appropriate axles and respective toggle joints been interconnected with the dowel cup of the hinge.

Claims

1. Furniture hinge, comprising a hinge arm (1), which is by means of toggle joints swingably connected to a dowel cup, the hinge arm (1) being dismountably and adustably arranged on a base plate (4) of the hinge, fastened to a side panel of a unit of furniture, and the dowel cup of the hinge arm (1) being fastened to a leaf of a door of a unit of furniture or the like, and connected to the base plate (4) on at least three points, **characterized in that** the base plate (4) of the hinge provides a high-level step (16), in which there is in coincidence with a longitudinal slot (19) of the hinge arm (1) arranged a taphole (4') for the threaded shaft (21'') of a fastening screw (21), the base plate (4) terminating by a hollow part open to the rear end, said hollow part on the upper surfaces of side walls (9) providing transversal ribs (11) for the cooperation with respective ribs (12) of the hinge arm (1), the sidewalls (9) of the high-level step (16) forming a box section of the base plate (4) of the hinge; **that** in the base part of the hinge arm (1) bent in transversal section to form a \cap , there is foreseen a female thread (14) into which an adjusting threaded bolt (5) is screwed, which by its bottom surface (5') rests on the upper surface of the high-level step (16), the hinge arm (1), besides, providing a depression (20), which comprises a longitudinal slot (19) terminated by a circular widening (19') for passing the screwhead (21') of the fastening screw (21), opposite this circular widening (19') arranged in the depression (20) there being foreseen an upright border (23) on which abuts the screwhead (21') of the fastening screw (21), for preventing the hinge arm (1) from disassembling, **and that** on the free end part of the hinge arm (1) an arcuated depression (13) is foreseen below which transversal ribs (12) are

provided for cooperation with the ribs (11) of the base plate (4) of the hinge.

2. Furniture hinge, according to Claim 1, **characterized in that** the arching of the arcuated depression (13) of the hinge arm (1), below which transversal ribs (12) are foreseen, corresponds to a circular arc so that the connecting line between the center of this circular arc and the mating point of the ribs (11; 12) is steadily normal to the ribs (11) of the base plate (4).
3. Furniture hinge, according to Claim 1, **characterized in that** the bottom surface (5') of the adjusting threaded bolt (5) is flat, rounded, hemispherical, or the like.

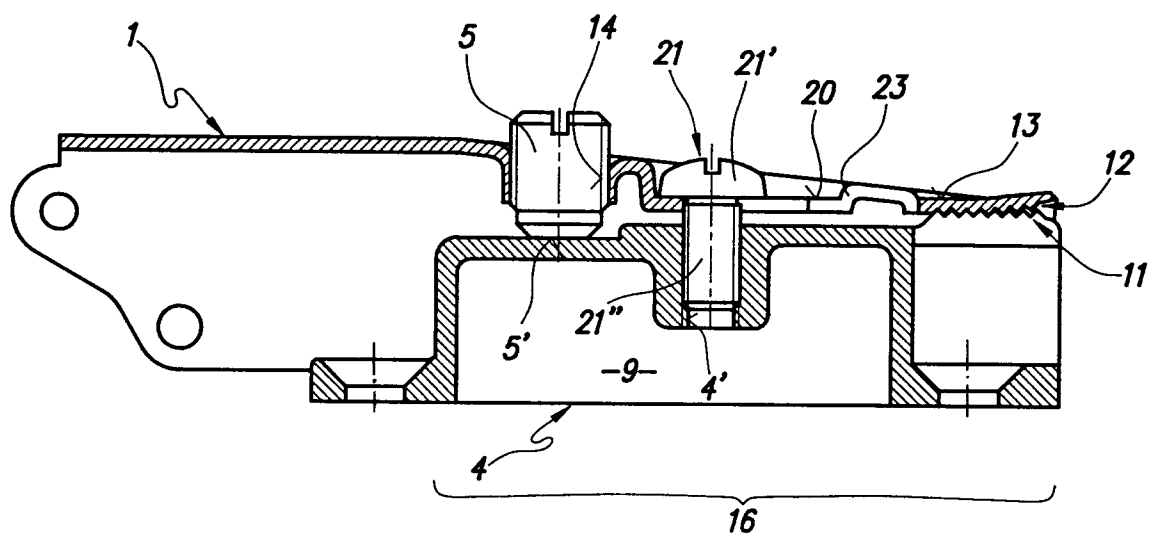


Fig. 1

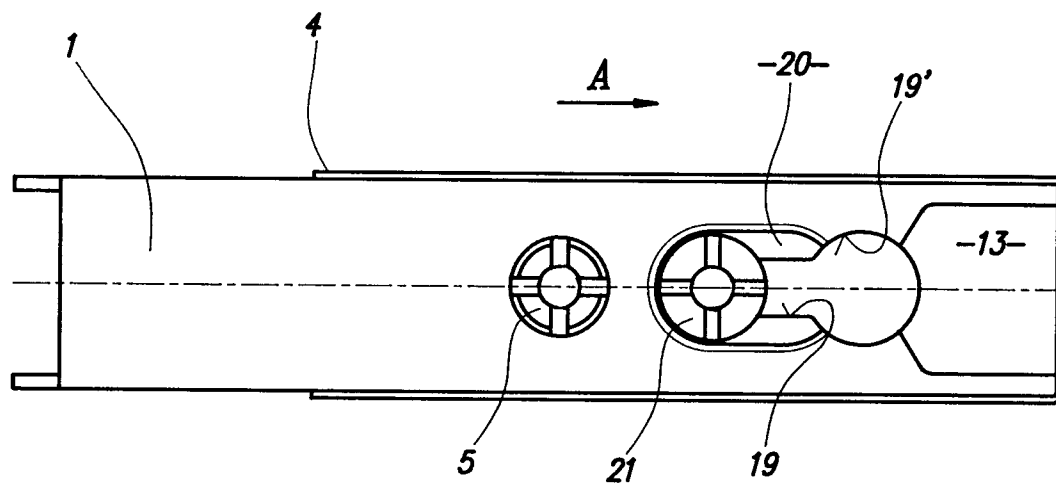


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 91 11 7926

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-2 072 254 (JULIUS BLUM)	1,3	E0507/04
A	* page 2, line 37 - line 43; figure 4 *	2	
Y	FR-A-2 618 178 (RATTI SILVIO S.A.S. DI RATTI FAUSTO & CO.)	1,3	
	* page 5, line 19 - line 28 *		
	* page 5, line 34 - page 6, line 3; figures 1-4 *		
A	GB-A-2 101 200 (NICO MANUFACTURING LTD.)	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-2 046 757 (K. LAUTENSCHLAGER)	1	
The present search report has been drawn up for all claims			E050
Place of search THE HAGUE		Date of completion of the search 10 APRIL 1992	Examiner GUILLAUME G. E. P.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	